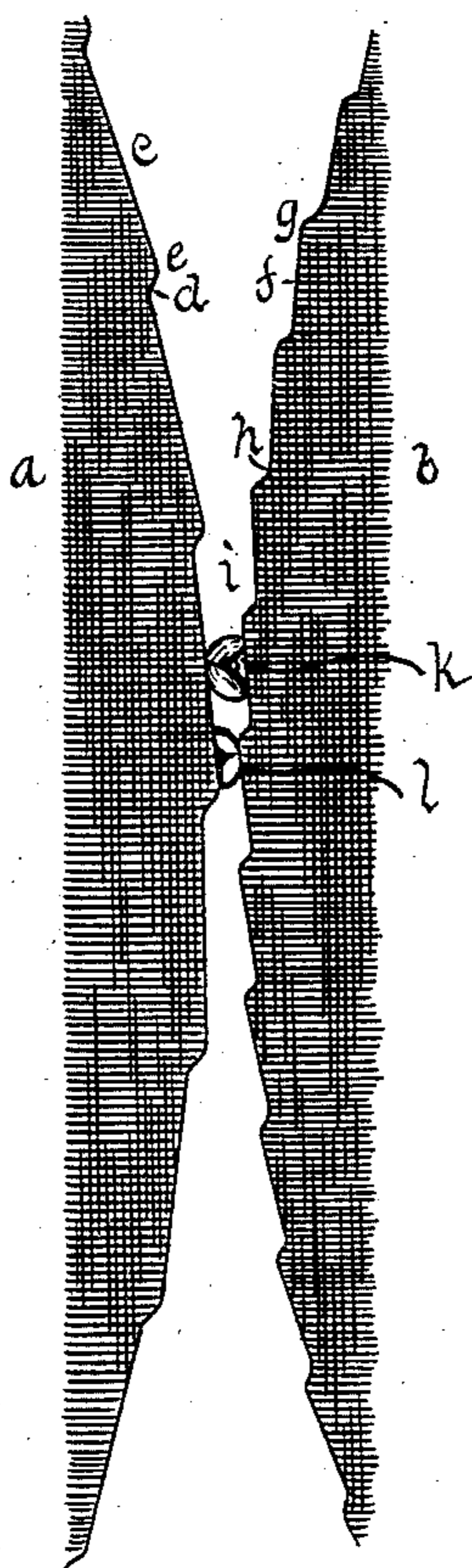


(No Model.)

F. BEALL.  
GRINDING MILL.

No. 364,628.

Patented June 14, 1887.



ATTEST

C. C. Clark  
J. V. Bills



INVENTOR

Frank Beall  
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# UNITED STATES PATENT OFFICE.

FRANK BEALL, OF DECATUR, ILLINOIS.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 364,628, dated June 14, 1887.

Application filed October 11, 1886. Serial No. 215,853. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK BEALL, of the city of Decatur, county of Macon, and State of Illinois, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

It is the object of my invention to provide a "first-break" for grinding-mills that will part wheat grains of all sizes in the crease without breaking the same, and so permit the subsequent removal of the crease-dirt without waste of flour, it being well known that the flour produced by breakage of the grains, previous to the removal of the crease-dirt must pass off with the crease-dirt and enter into mill-feed or a very low grade of flour.

The force I employ to part the grains is a combination of direct pressure and friction, the former predominating; and I avoid breakage of the grains, except at the crease, by the peculiarity of the force employed and by the construction of the compressing medium, in which there are no sharp breaking or cutting angles.

My invention consists in a pair of opposing rolls having differential rotation in opposite directions and placed slightly nearer together than the smallest diameter of a small grain of wheat, both rolls having longitudinal furrows consisting each in a plane surface approximately tangential to the periphery of the roll and a comparatively abrupt surface, the said abrupt surface being composed of an inner concavity and an outer convexity, which together constitute an ogee, the abrupt surfaces of the furrows of the slow roll being presented in the direction of the roll's rotation, the abrupt surfaces of the furrows of the fast roll being presented in the direction opposed to the roll's rotation, and the furrows of the slow roll being about twice the width of the furrows of the fast roll.

In the drawing accompanying and forming a part of this specification the opposing surfaces of rolls are shown.

*a* is the slow roll, having rotation in the direction indicated by the adjacent arrow.

*b* is the fast roll, having rotation in the direction indicated by the adjacent arrows, and, as suggested by the number of arrows, having

a rotative speed approximating three times the speed of the slow roll.

*c* is the plane approximately tangential surfaces of the furrows of the slow roll.

*d* is the inner concavity, and *e* the outer convexity, of the abrupt surfaces of the slow roll.

*f* is the plane approximately tangential surfaces of the furrows of the fast roll.

*h* is the inner concavity, and *g* the outer convexity, of the abrupt surfaces of the fast roll.

*i*, *k*, and *l* indicate the gradually-decreasing space between the furrows of the respective rolls, and also show how an approximate parallelism is maintained between the plane surfaces of said furrows throughout their entire co operation.

The ogee-formed abrupt surfaces *d e* of roll *a* are presented in the direction of the rotation of the roll. The ogee-formed abrupt surfaces *g h* of roll *b* are presented in the direction opposed to the rotation of the roll.

The wheat is fed to the rolls from above, and the large grains are split, say, in space *i*, the medium-sized grains in space *k*, and the smallest grains in space *l*, from whence the entire product is discharged.

As nearly as may be determined, the operation of the rolls in parting the grains in the crease is almost entirely compressive, the tangential friction caused by the differential motion assisting somewhat, but to a comparatively small degree; and, notwithstanding the fact that the motion of the rolls is rotative, the action of the furrows is practically reciprocating, the opposing plane surfaces approaching and receding in approximately-parallel planes.

The compression of the plane surfaces of the furrows, as above set forth, causes the grains to break always in the weakest part—namely, the crease—and the ogee formation of the abrupt surfaces prevents the breakage of the grains by impact, as no sharp edges are left to cut the grains nor angles to hold the grains endwise to the approach of the opposing compressive surfaces.

The rolls are placed sufficiently near each other to part the smallest grains of wheat; but this will not be near enough to break a half of a large grain, as there is not such diversity

in the diameter of wheat grains that a half of a large grain should be as large as a small grain. The tangential surfaces of the furrows are entirely plane, for the reason that corrugations would tend to break the wheat.

In the drawing the various parts are represented of double size, but of preferable proportion, the furrows of the slow roll being twice the width of the fast roll, and the depth of the furrows in both rolls being equal.

I claim—

1. A first-break for grinding mills, consisting of a pair of opposing rolls having differential rotation in opposite directions and placed slightly nearer together than the diameter of a small grain of wheat, both rolls having longitudinal furrows consisting each in an approximately tangential plane surface and a comparatively abrupt surface, the said abrupt surface being composed of an inner concavity and an outer convexity, which together constitute an ogee, the abrupt surfaces of the furrows of the slow roll being presented in the direction of the roll's rotation, the abrupt surfaces of the furrows of the fast roll

being presented in the direction opposed to the roll's rotation, and the furrows of the slow roll being about twice the width of the furrows of the fast roll.

2. A first-break for grinding mills, consisting in a pair of opposing rolls having differential rotation in opposite directions and placed slightly nearer together than the diameter of a small grain of wheat, both rolls having longitudinal furrows consisting each of a plane surface approximately tangential to the periphery of the roll and a comparatively abrupt surface having its outer surface rounded, the abrupt surfaces of the furrows of the slow roll being presented in the direction of the roll's rotation, the abrupt surfaces of the furrows of the fast roll being presented in the direction opposed to the roll's rotation, and the furrows of the slow roll being about twice the width of the furrows of the fast roll.

FRANK BEALL.

Attest:

C. C. CLARK,  
L. P. GRAHAM.